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ABSTRACT

The purpose of this project was to investigate the perceptions of instructors and students with regard to delivering effective instruction in synchronous learning environments. The specific research goals were to attain an evaluation of the quality of distance education courses, to determine the effectiveness of the delivery medium, and to examine instructors' and learners' perceptions of the instructional strategies implemented in courses delivered through the medium of real-time audio-video teleconferencing via the North Carolina Information Highway. (Contains 10 references.) (Author)

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An Analysis of Instructional Strategies Used in Synchronous Learning Environments

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Abstract: The purpose of this project was to investigate the perceptions of instructors and students with regard to delivering effective instruction in synchronous learning environments. The specific research goals were to attain an evaluation of the quality of distance education courses, to determine the effectiveness of the delivery medium, and to examine instructors' and learners' perceptions of the instructional strategies implemented in courses delivered through the medium of real-time audio-video teleconferencing via the North Carolina Information Highway.

Introduction

Distance education programs across the country have been expanded to meet increased needs in higher education. Traditionally these courses have used face-to-face, two-way interactive video, and web-based instruction. Guidance often consists of learning about the use of cameras, PowerPoint, video options, and web boards. Numerous training manuals have been written in this field with a questionable basis in research. Educators need to make sure that technology is not driving the learning experience when there is added pressure to enlarge the number of students in various programs. In addition, educators who understand pedagogy must take the lead in teaching techniques via distance. Before we continue serving students with distance learning we need to answer some essential questions regarding effective teaching in synchronous and asynchronous environments. In search of the answer, the fields of education and technology have studied student perceptions comparing online to traditional lecture class quality (Ryan, 2000), the achievement of students in distance education and traditional classrooms (Schulman & Sims, 1999; Dominguez & Ridley, 1999), demographics of students taking online courses (Guernsey, 1998), staff training needs (Connell, 1998), support for faculty teaching (Bremner, 1998), and community and team formation in distance education classrooms (Berg, 1999) and numerous other subjects. We have also examined traditional versus nontraditional roles for the teacher and new paradigms for on-line learning (Bourne, McMaster, Rieger, & Campbell, 1997; Shneiderman, Borkowski, Alavi, & Norman, 1998). The need still exists to examine the role of the teacher and effective strategies for effective teaching. As Shneiderman (1998) wrote, "technology can be wonderfully empowering for teachers and students, (but) the relationship between human beings is still the heart of the educational process."

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Purpose

This study attempted to examine the perceptions of teachers and students in distance education classes taught by university faculty from a college of education. Graduate students who were practitioners in various fields of education were the participants in these synchronous classes. It was anticipated that this pool of students would give insight into appropriate and inappropriate uses of various teaching strategies and techniques due to their expertise in education. A web site with a discussion board was created to allow for interactions among students about: 1) the quality of learning, 2) effective teaching strategies, and 3) the effectiveness of the media of course delivery. Four instructors with experience teaching in synchronous learning environments also responded to these questions and their responses were also compiled, analyzed, and compared with student summaries.

Theoretical Framework

The conceptual framework that serves as a philosophical basis for our institution posits that faculty and students come together as a community of inquirers to examine the aims of education and the nature of teaching and learning for achieving worthwhile educational goals. Teaching is viewed as a dynamic, goal-oriented, social activity, and learning is perceived as an active process of acquiring, assessing, and producing knowledge. We collectively embrace the exploration of new forms of teaching and learning through experimenting with emerging technologies. To this effort, we work as a community of practitioners who embrace the social constructivist perspective and encourage discourse from various levels of participants in solving educational problems.

The Study

When the researchers in this study determined a need to engage graduate students in a collaborative effort to evaluate the quality of their learning experiences from courses offered via distance learning, two groups of students were selected. These two groups of students consisted of majors from the field of instructional technology and elementary and middle grades education who were currently employed in their field of expertise. The technology majors were enrolled in the course *Planning for Technology in Education*. It is one of the advanced courses students must complete for a graduate degree and K-12 licensure in instructional technology in North Carolina. The course emphasizes the development of technology plans at local, school, and district levels. In addition, the issues and processes of successful grant writing are explored. This course was taught simultaneously to two groups of students at remote sites and one group on the campus. The remote sites had computers for each student, while the main campus site required students to use a computer lab located in another building. Each site had a technician to assist with the overall operational details of the teleconference. A web-based supplement was also developed for the course that included an orientation, daily outline and assignments, resources and a threaded discussion forum. The instructor for this course had previously taught with this delivery medium. The elementary and middle grades education majors were enrolled in the course *Connecting Learners and Subject Matter*. It is one of the required courses for all education majors for the graduate level degree. The course emphasizes effective strategies for ensuring student mastery of content. This course was taught simultaneously to two groups of students with one group on the main campus and the other section at a site approximately 90 miles away. Each site had a technician who assisted with cameras, sound, equipment, and trouble-shooting when the technology difficulties occurred.

The North Carolina Information Highway (NCIH) program used in this distance learning study provided video teleconferencing capability to universities and public schools across the state. The "Highway" originally established for video communication today serves as the centerpiece of the states high-speed data network, supporting the data, voice, and video needs of all government at the state and local levels as well as school systems and other public entities. Using the high-speed backbone of the

North Carolina Integrated Information Network (NCIN), our NCIH services provide broadband connectivity and setup of on-site video conference rooms to support a host of point-to-point and multi-point conferencing applications, including the distance learning medium used in this study.

Altogether 73 students were enrolled in these two classes. The instructional technology majors were aware of the synchronous learning environment in advance. However, the students enrolled in *Connecting Learners and Subject Matter* were not informed in advance of the delivery system to be used. These students met for a sixteen-week semester and when the courses were complete, they were asked to provide feedback on their pedagogical and technological experiences. These students volunteered to participate in an open-item questionnaire that was designed to collect demographic data and feedback regarding the quality of their learning experiences in these distance education courses versus courses that did not involve this delivery system. Students also analyzed the effectiveness of teaching strategies used in these courses and the effectiveness of the NCIH. The survey was posted on a password protected website and required students to give permission for their comments to be used in a research study. Results were summarized and presented below.

Research Questions

Each graduate student enrolled in these two courses was invited to participate in a research project designed to assess the quality of the delivery system used in their class and to examine their perceptions of the instructional strategies used. The following questions were posted on a password protected website.

1. Contrast the quality of the learning experience in distance education courses versus on campus courses (interaction, instruction, assessment, etc.).
2. What teaching strategies have you found to be effective in distance education courses?
3. How effective was the medium for delivery of the class (ie. NC-REN, NCIH, web-based)?

Altogether 46 students logged onto this website and participated in this research project. Four instructors responded to the survey.

Findings from Students' Responses

In the following narrative, the students' responses to the research questions are summarized. Specific quotes are used to highlight student perceptions.

Question 1

When students were asked to evaluate the courses delivered in synchronous environments using NCIH, the quality of instruction was perceived as high and being "as good or better than courses taken on campus." However, students reported a strong preference for the professor to be at their site and felt that "instructors should be required to spend equal time at the various sites. Students miss a lot by not having direct contact with the instructor." One student wrote, "...the quality of instruction is not diminished by the remoteness of the instructor and learner" and further stated, "We tend to work more cooperatively as a group because of the distance, therefore, depending on one another more." Another student commented, "Distance education is a good tool if all people included work together to make it successful. I don't believe it can be successful when the groups are looked upon as separate entities. We must be a whole."

Several respondents commented on the limitations of distance education courses. "The frustrations of the technological problems... made this class difficult and often non-productive," wrote one student. Statements such as the following were posted. "A few glitches occurred with the delivery because of the equipment." "Time was wasted due to technical difficulties." "As technology bugs are worked out, distance learning should improve." These comments appear in the final research question as well.

In summation, while students prefer direct instruction with the professor, many would not have been able to obtain a graduate degree due to living a distance from the university campus. The convenience of this delivery medium has "truly benefited" the majority of students.

Question 2

Graduate students were asked to reflect on the effectiveness of the strategies used in distance education courses. The majority of students commented that small group discussions and cooperative learning activities were the most "effective strategies used by the professor." One student stated, "I believe that small groups discussing the topics and then coming together as a whole is the best strategy I have used." This use of instructional time allows students to "get things accomplished without the hassle if technological problems." Another stated, "Small group discussions kept the program personal and relevant." "The instructors were adept at encouraging students to pursue areas of interest."

One student commented, "Just like in a regular classroom, variety is key: Cooperative Learning, Videos, Power Point, Direct Instruction (providing that the technology is working). For two sites, it is effective to bounce questions back and forth so that you can get everyone involved and sharing." "Power point and the overhead were good to supplement direct instruction" because visual learners need additional support. Literature circles used in the *Connecting Learners and Subject Matter* class was cited as a "very effective strategy" also.

Least preferred by students were lectures and large group discussions. For example, "whole group discussion was limited to the technological difficulties" of having cameras and sound focused on the speakers.

Question 3

Determining the effectiveness of the NCIH delivery system was the purpose of the third question in this survey. Students enrolled in *Connecting Learners and Subject Matter* reported more frustrations with the delivery medium than their counterparts in the *Planning for Technology in Education* course. Technical difficulties such as "...voice delays, freeze frames, and just being down were common to our classes this term." Most students made comments such as the "...the NCIH was not successful in truly making the class a good learning atmosphere." "I know that the technical folks here worked really hard; however, we have experienced technical problems," and "NCIH has a lot of room for improvement."

To the contrary, students enrolled in the technology course said, "NCIH has worked well. We've only had a few instances when connections did not work. The biggest problem was that voices broke down often and at times the volume from campus was very low." One student reported that this delivery system had been used frequently and they had learned the value of flexibility." However, one of thee students questioned the amount of money the state invested in this technology saying, "It would be better to just have web-based courses." Another concluded that though there were technical problems, they far outweighed the safety concerns of having to drive 60 miles at night through winter weather, and the fee was affordable."

In summary, both groups of students see NCIH as a good idea that will continue to be a part of graduate level education.

Findings from Instructors' Responses

Each of the authors in this project has had experience teaching in synchronous learning environments. When queried, each gave responses to the survey questions posed to the students enrolled in these two graduate level courses. Examples of summarized responses are included to provide insight from their perspectives.

Question 1

When instructors were asked to contrast the quality of the learning experience in distance education courses versus on campus courses, the following comments were dicited. "When I create a

course for students, I begin with a philosophical stance and an examination of the goals and objectives for the course. Then I consider the delivery medium, as in the case of face-to-face instruction versus satellite delivery of content. My goal is to maintain the quality of instruction in each learning environment and to ensure that each student masters the content of the course with a high level of satisfaction." "I taught an off-campus introductory course with undergraduate students enrolled in an elementary education cohort. These students were adult learners juggling family responsibilities, full-time jobs and two evening courses over a fall semester. As an instructor, I am committed to incorporating social constructivist teaching methods into the teaching and learning of a course. It was my goal to deliver this course via satellite with the same quality as an on-campus course." Another instructor made this comment. "I have taught campus based face-to-face, remote synchronous audio/video conferencing based courses (both site-to-site and site-to-multi-site). Learning on campus or delivered at a distance must retain the same high qualities expected of adult graduate education. Regardless of delivery systems used, one would expect students to become independent learners, to explore ideas beyond their usual comfort levels, and to develop practical meanings and applications from their studies. Face-to-face communication enables an instructor to continually monitor the nuances and progress of individuals and groups toward these goals. Using distance delivery systems, the instructor must develop new ways of assessing progress. This includes giving up much of the local 'control' associated with traditional teaching. It also requires a strong emphasis on the student's responsibility for learning. Using distance modes of delivery has not diminished the quality of student learning as measured by the stated goals; however, these goals may differ from those associated with more traditional instruction." The fourth response follows. "My initial thought on the quality of the learning experience in distance education courses was that these classrooms were inferior to traditional face-to-face teaching situations. As a teacher who enjoys a lot of communication, physical movement, and group interaction in classrooms, it was hard to look past the model of the talking head in distance education. At first, I felt like a news reporter that should stay in one place and restrict movement. After several weeks, I became more comfortable with the new environment and realized that the surroundings could be adjusted for effective learning. At this time I retreated to my knowledge base of good teaching and used effective strategies that have worked in other learning settings."

Question 2

Instructors' perceptions of teaching strategies found to be effective in distance education courses via satellite are summarized here. "I believe 'best practice' requires the use of effective research proven strategies and that requires a socio-constructivist bent as is articulated in the conceptual framework which guides the practices of our faculty. As a result, I strive to create a classroom that is characterized by a community of learners who collectively and collaboratively solve problems and engage in activities designed to enhance their understandings of subject matter. Specific strategies include small cooperative group assignments, presentations, and discussions, as well as guest speakers, lectures, PowerPoint presentations and videos. The underlying goal is to engage students in constructing their own understandings of subject matter." "I used small group cooperative learning activities, web board discussions, and literature circles in addition to discussions and presentations with this class. I made the decision to travel to the class site every other week and to conduct the class via NCIH on alternate weeks. I did this because I believe the richness and immediacy of face-to-face communication was needed with this particular group of students." "Teaching strategies that seem to enhance my distance education courses include interactive websites, assignments which guide but not direct, group interaction, executive summaries, projects, and guest speakers." "Direct instruction and lecture were effective if I kept thoughts concise and frequently interjected student comments, video examples, and other visuals. Group discussions and cooperative learning were initially difficult for me because I felt the need to closely monitor the groups. Presentations that allowed the students to experience communication through a synchronous environment were highly successful."

Question 3

The question regarding the effectiveness of the medium for delivery of the class (ie. NC-REN, NCIH) received the following reactions. "As long as the cameras, sound equipment, and the links to remote sites were working correctly, my instructional goals were met. However, on days when the technology support

personnel had difficulty with the equipment, delays occurred, and learning goals were not met. It became clear that the greatest barrier to effective teaching via synchronous delivery systems was a medium that did not work!" "I found that the time delay in the two-way interactive video transmission hindered class understanding and learning. Discussion was very important in order to teach and learn concepts. It was impossible to maintain the affective elements of a discussion, particularly maintaining eye contact, reading body language, and conveying non-verbal messages via the two-way interactive video medium. I subsequently ended the NCIH and traveled to the site weekly for class. The web-assisted medium of the web board discussions worked very well. Students learned how to use a piece of technology, could complete the assignment at a time convenient for them (asynchronous), and participated in a small community of learners. The students worked in this same team during class time and the carry over from class to the web board was very effective. In conclusion, I believe the two-way interactive video is dependent upon factors out of the instructor's control, such as bandwidth allotted for the transmission, skill of technicians assigned to the class, and the learning needs of student populations. As such, the quality of instruction is variable. The web board, in my experience, was an excellent teaching and learning tool." "In my experience, each distance delivery medium has capabilities that emphasize different aspects of learning. One of the greatest challenges for each mode of distance education is how to best engage students in conversations with each other. The available technology may enhance or diminish these communications. I have found, for instance, that in using synchronous audio/video, it was difficult to meaningfully engage small groups at each of the multi-sites and provide them with opportunities to share their work at other sites. The non-dependability of the synchronous environments require that each site had access to the web for each session so that students could work independently if the technology failed. Another great challenge is to switch from being a dispenses of knowledge to being a guide – and trusting students to take responsibility for their own learning." "Technological problems hindered my class and affected the effectiveness of learning. On several occasions I did not have the necessary support to change camera angles, switch to PowerPoint, or watch videos. There was not a good working relationship between the technical staff and the instructor. (Staff usually consisted of students who were often replaced during the semester and sometimes during the class period.) The technical problems between two sites also ranged from delayed audio and visuals to complete disconnection. All of these problems were very frustrating and prompted me to begin driving between the two sites on alternative weeks. When I teach in a synchronous environment again, I will also create a web to assist the class with assignments and to create another method for interactions. This medium was highly effective when I asked a colleague to help teach at the second site. He kept students performing at one setting while I was teaching and interacting at the other."

Discussion

Teaching is a complicated task even in the most favorable of conditions. Teaching and learning in a nontraditional environment requires both the teacher and learner to modify how they interact. The instructional strategies employed in distance programs must be examined from the perspective of the learner and the instructor. Instructors must be apprised of specific guidance based on research. By analyzing the perceptions of classroom teachers and instructors in their roles as students, we can delineate good from poor practice. Studies such as this offer much insight into the pedagogical issues that accompany the integration of new forms of technology.

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